

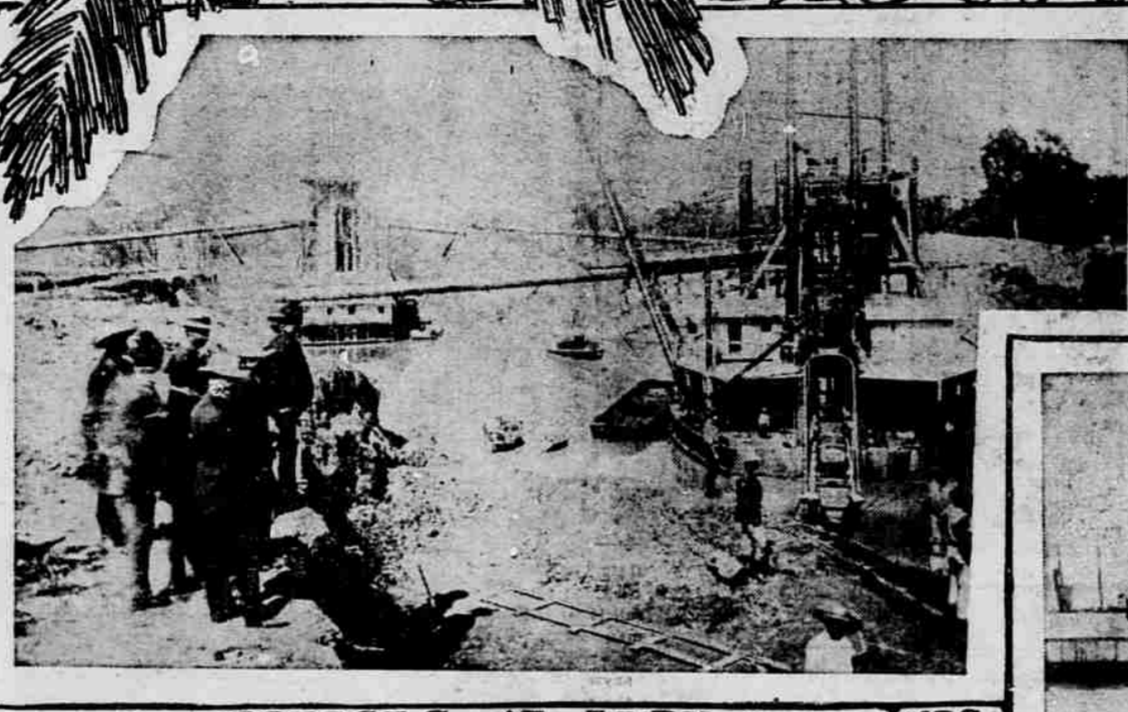
THE MUCH-DISCUSSSED PANAMA CANAL ROUTE



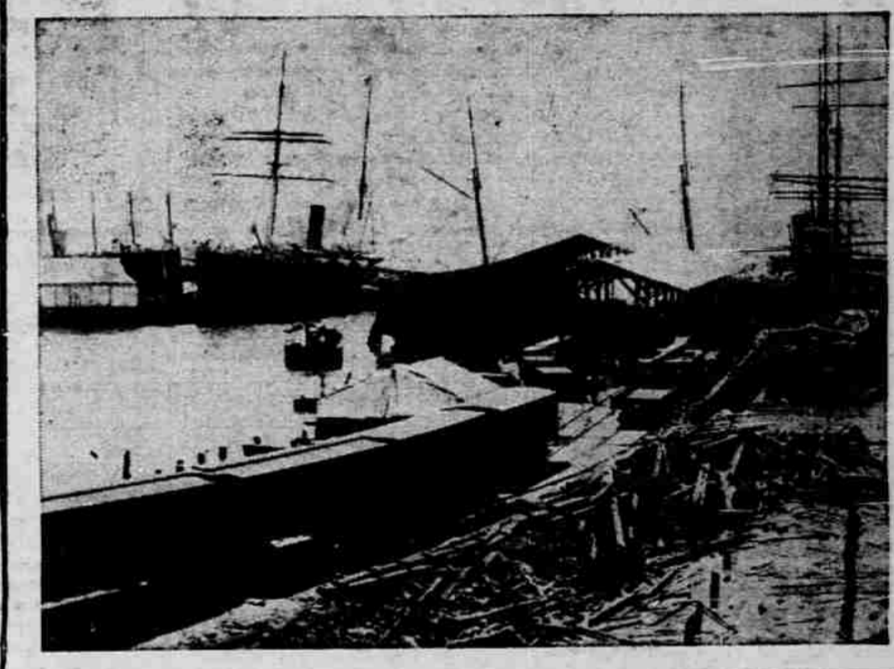
COMMISSION ENGINEERS IN CAMP.



WELCOMING THE CANAL COMMISSION



DREDGES AT WORK



TRAFFIC AT TERMINAL PANAMA R.R.



COMPANY HOTEL ON CANAL

Of the Numerous Projects Proposed and Paths Surveyed For a Trans-Isthmian Waterway There Are Practically But Few That Survive. Sea Level Stream Was De Lesseps' Original Notion, But It Has Given Way to One of Locks. Tides Made His Plan Impossible.

THE Senate can decide upon but one canal, but no matter which route is chosen, a thousand hopes—hopes that have come to be the very existence of their followers—will be blasted forever. The Panama has been generally known as the pet canal scheme, but since the days of Magellan and Balboa every plan for the passage of the Isthmus has had its enthusiasts, more numerous because the scheme is nearer within the reach of man, but just as blindly zealous as the advocates of flying machines.

Numerous Schemes. There have been schemes for ship railroads, to carry loaded vessels, bodily, by rail from sea to sea; schemes to tunnel through the Cordilleras a cut big enough to pass a ship; schemes to lift vessels over the mountains, and schemes for sea level canals. Of the first of these plans the route across Mexico by Tehuantepec is an example; of the second a route below Panama, the even recently revived Darien route; of the third Nicaragua, particularly, and the last Panama.

De Lesseps' Idea. A sea level canal was de Lesseps' original idea for the Panama Canal, but it has given way to one of locks, the difference in a level of tides on the two coasts making a high canal impossible. Of the many projects proposed and routes surveyed, these last two, Panama and Nicaragua, are practically all that survive, and their respective promoters and supporters are making their last grand struggle for mastery, never before with such even chances.

Work Resumed in 1895. It is not generally known that work on the Panama Canal was resumed in 1895, and has been continued almost or quite to this day. In order to save some of the \$260,000,000 de Lesseps' company spent, and to retain the valuable concessions granted it, the receivers of the old organization, who hoped by further original company, who hoped by further subscription to save part of their original investments. Thirteen millions of dollars was all, however, they were willing to

invest, and this only eleven days before the expiration of the original concession. An extension of the time limit for completion to 1910 was secured.

Made Every Dollar Tell. The new company did not waste the \$13,000,000 in mere show on soft ground, but, in contrast to its predecessors, made every dollar tell in the hope of retrieving lost confidence, or, failing to secure further investments, as it did, to make the partly built canal more valuable when the Clayton-Bulwer treaty should be abrogated and the United States should enter the field as a possible purchaser.

Clayton-Bulwer Treaty. The Clayton-Bulwer treaty "relative to the establishment of a communication by ship canal between the Atlantic and the Pacific oceans," signed in 1850, was, it will be remembered, the cause of some terrible suggestions in Congress. It was a long, tedious task to get Great Britain to substitute the Hay-Pauncefote treaty for that declaration by the governments of the United States and Great Britain that "neither one nor the other will ever obtain or maintain for itself any exclusive control over the said ship canal." War was several times last year suggested, but President Roosevelt's first message bore the tidings: "I am glad to be able to announce to you that our negotiations on this subject with Great Britain have resulted in my being able to lay before the Senate a treaty, which, if ratified, will enable us to begin preparations for an isthmian canal at any time and which guarantees to this nation every right that it has ever had in connection with a canal."

A Long Story. The treaty, it is well known, was ratified. The whole story of the isthmian canal would require volumes. As the matter now stands in Congress, the Hepburn bill, providing for the building of the canal by the Nicaragua route, has passed the House, while the Senate Committee on Isthmian Canals has agreed—7 to 4—to favorably report the measure in that body. A minority report will also be presented and a vigorous fight is anticipated. Here is a brief outline of the plans

that the disinterested may know something of the matter should they happen into the Senate during a discussion. The Panama Canal is now just 40 per cent completed—that is, according to original designs and dimensions; but not according to the suggestions of the Isthmian Canal Commission. The Atlantic side is open to a distance of thirteen miles. The excavation was to a depth varying in different localities from sixteen to twenty-nine and a half feet; but, having been completed and passed over for so long, the depth has been diminished by silt deposits from the Chagres River, in the bed of which the canal lies partly, and from other causes. On the Pacific side about three miles is cut from six to twenty-six feet. In Panama Bay a channel has been dredged to deep water, the anchorage off the island of Saos; and the Culebra cut through the rocky Cordilleras has been accomplished to a depth of 160 feet.

Nicaraguan Route Surveyed. In 1850-52 the Transit Company, which then controlled all the trans-isthmian traffic, had the Nicaraguan route surveyed. Twenty years later the United States despatched a commission to look over the route. Mr. A. G. Menocal, of that commission, when the Panama scandal began, personally secured a concession from the Nicaraguan Government for the construction of a canal and the Nicaraguan Canal Construction Company was organized. In 1888, the same year that the Panama Company suspended operations, the concession was transferred to the Maritime

Canal Company, a new organization, and the Construction Company went out of existence. The special feature of the Nicaraguan route is the great inland sea which lies in the hollow between the eastern and the western Cordilleras—Lake Nicaragua. It is forty-five miles wide, 110 long, and 110 feet above the level of the sea. The plan of the Nicaraguan Canal comprises an engineering feat of the most wonderful kind ever attempted. In the Isthmian Commission's estimate of the time it will take to construct the canal, six years are given to the construction of the dam across the San Juan River, while but two more will serve to

complete the waterway. The San Juan leaves the southeast corner of Lake Nicaragua and flows almost east into the Caribbean Sea. The first half of its length from the lake is one succession of rapids and waterfalls. It is then joined by the Rio San Carlos, and its size doubled. Two miles above this juncture is the site for the great dam. **San Juan's Flow.** The San Juan, in its normal state, has a flow of 20,000 cubic feet per second, but in the rainy season it sometimes amounts to 200,000. To hold back this flood with a dam 150 feet high and thereby raise the waters of the river to the level of the lake is the project. This is the great work on the Nicaraguan route. The other dams and levees and embankments are all within the province of engineering experience. **General Opinion Incorrect.** It is the general opinion that there is quite a difference between the levels of the two oceans. Such, however, is not the case. The levels are about the same, but the tide of the Pacific has a range of eight feet, while that of the Atlantic has only one. A 36½-foot and four 18½-foot locks will be required to raise vessels from the Caribbean to the lake's level.

On the Pacific side four 23½-foot locks will do the work. The estimated cost of the Nicaragua Canal has steadily risen from a sum around \$50,000,000 to the Isthmian Commission's figures of \$189,864,962. The first, however, was for a sixteen-foot-deep canal of narrow gauge, while the last is on a thirty-five foot depth, and a width of 150 feet. **Cost for Completion.** The estimated cost of completing the Panama Canal to these dimensions is \$144,233,358. The Commission values the Panama Canal in its present condition at \$40,000,000. The original offer of sale at over \$100,000,000 was the cause of the Commission's first recommendation of the Nicaraguan, and the fall to our figure when the Hepburn bill passed the House was the cause of the Commission's change of verdict in favor of the shorter route. The total length of the Nicaraguan route is 183.65 miles; that of Panama 45.09. It will take a steamship of the average size twelve hours to pass through Panama if a canal with locks is constructed, and four hours if one at sea level could be built. A sea-level canal cannot be built across Nicaragua because of its great lake at the great height above the sea that must be crossed. Thirty-three hours will be required for the same vessel to cross through Nicaragua.

RECENTLY ESTABLISHED NATIONAL BUREAU OF STANDARDS

THE National Bureau of Standards is the name of a recently established bureau in the Treasury Department, which will be of inestimable benefit from a commercial and scientific point of view. This newly-created bureau will supersede the office of weights and measures of the Treasury Department, and its scope will be greatly extended beyond that of the old office mentioned. The new bureau was created by an act of Congress approved March 3, 1901, which act also provides for the appropriation of a sufficient sum not to exceed \$250,000 for the erection of a suitable building for a laboratory, including plumbing, piping, wiring, heating, lighting, and ventilation, and a further sum of \$10,000 for equipping the same and a sum not exceeding \$25,000 for a site for the laboratory, besides the sum of \$12,140 for the payment of salaries provided for by the act. In addition to the physical laboratory and administration building there will also be erected a large powerhouse. The site for the buildings has already been purchased, and is located in the north-western part of the city, near the intersection of Connecticut Avenue and the Pierce Mill Road, on the first ridge north of Cleveland Park, which has an elevation of 250 feet above the Potomac River. The buildings when erected will be fully one thousand feet removed from the Chevy Chase electric car line. The Supervising Architect of the Treasury Department, James Knox Taylor, is now engaged in preparing the plans for the two structures and expects to com-

plete his work at an early date. The buildings will be of brick with a light-colored stone trimming. The main building, or physical laboratory, will have a dimension of 174x50 feet and will be three and one-half stories in height, with an extended basement. The first floor of the powerhouse will contain the boilers, engines, dynamos, and heating and ventilating machinery and refrigerating apparatus. The instrument shops, testing laboratories, drafting rooms, and office will occupy the second floor, and the third floor will contain the carpenter shops, other laboratories, and storage rooms. Work upon these buildings will be commenced some time during the coming spring, and will probably be completed within a year. The new bureau is under the charge of the director, Prof. Samuel W. Stratton, a graduate of the University of Illinois and a member of the faculty of that institution for some time. Subsequently he was called to the chair of physics in the Chicago University and planned and supervised the construction of the famous Ryerson physical laboratory of Chicago University. He is also member of the Cosmos Club, the Meteorological Society, member of the Assay Commission, and an acknowledged authority on mechanical and electrical engineering. His salary as director of the bureau is \$5,000 per year. The physicist of the bureau is Prof. Edward B. Ross. The total number of officers and employees provided for under the act of Congress is twelve, whose annual salaries aggregate the sum of \$27,

140. The other officers and employees of the bureau are a chemist and two assistants, two laboratory assistants, a secretary, clerk, engineer, mechanic, messenger, watchman, and laborer. In addition to the custody of the standards of weights, measures, etc., the functions of the new bureau are: 1. The comparison of the standards used in scientific investigations, engineering, manufacturing, commerce, and educational institutions, with the standards adopted and recognized by the Government. 2. The construction, when necessary, of standards, their multiples and subdivisions. 3. The testing and calibration of standard measuring apparatus. 4. The solution of problems which arise in connection with standards. 5. The determination of physical constants and the properties of materials, when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere. The bureau is authorized to exercise its functions for the Government of the United States, for any State or municipal government within the United States, or for any scientific society, educational institution, firm, corporation, or individual within the United States engaged in manufacturing or other pursuit requiring the use of standards or standard measuring instruments. "Hitherto the manufacture of physical, astronomical, chemical, and other scientific apparatus," said Director

Stratton, "has been confined almost exclusively to foreign countries, but this industry is growing in the United States at a rate which will soon place our productions equal to those of any other country. Our manufacturers of such apparatus have shown that they can compete with the foreign product in workmanship and design, but they are placed at a great disadvantage by reason of the fact that this Government does not provide them with the necessary standardizing facilities. German and English manufacturers furnish official certificates with their apparatus, and the value of such certificates is so well recognized that we find our own manufacturers quoting prices of their apparatus which have been verified in the institutions of foreign Governments. The value of the proposed bureau to this interest alone, it is believed, will be sufficient to warrant the expenditure of more than the entire cost of its creation and maintenance. This fact has been conclusively demonstrated in Germany by the Imperial Physico-Technical Institution, of Charlottenburg, established in 1887, which has been most liberally supported, and which has shown remarkable results. It has been frequently asserted that this institution is of far greater value to the scientific and commercial interests of this country than the provisions made hitherto by our own Government. It will be the purpose of those in charge of the administration of the National Bureau of Standards to conduct it upon practically the same lines as those employed by the German institution referred to. It is a well-known fact that the use-

fulness of a system of weights and measures to those who employ it depends on the unvarying identity of its determinations, and for this reason it has been a part of the public policy of every organized community, from the earliest period of civilization, to regulate such systems by law. Unfortunately, this kind of legislation, until the beginning of the last century, was left almost wholly in the hands of local authorities, who have proceeded without any attempt at concert or uniformity. This was in a marked degree the case in Europe, where scarcely a town of any commercial importance could be found which did not have its independent system of weights and measures. Naturally, the embarrassment to commerce growing out of this diversity of systems was very great. "The importance of accurate commercial measures cannot be overestimated," continued Director Stratton. "The establishment of a standardizing laboratory will be an exceedingly important factor in bringing about correct commercial weights and measures, a condition very much to be desired. Every scientific laboratory in the country, whether it be that of a school, college, or university, a sugar refinery, manufacturing chemist, railroad, steel works, or any other manufacturing concern in which modern methods are employed, requires constantly the use of the most accurate measures of weight, length, and capacity. "The bureau will be well equipped for work in electrical measurements. In alternating currents we will be able to measure voltages up to 100,000 volts and

to measure currents up to 10,000 amperes. The bureau will also be able to accurately determine the illuminating power and efficiency of electric arc and incandescent lamps, gas and gas burners, oils and oil burners, and the so-called "standard candle," now so unsatisfactory in determining accurately the "candle power," will be superseded by a more satisfactory standard of illumination. There are a "Special attention will be given to instruments for determining the purity of sugar, the specific gravity of liquids, thermometers, and pyrometers for low and high temperatures, barometers, pressure gauges, hygrometers—in fact, the bureau will be devoted to the promotion of all scientific, commercial, and industrial enterprises, as well as to the discovery, by new scientific investigations, still more accurate standards of all measurements relating to the advancement of such enterprises in the United States. "A moderate fee will be charged for tests and comparisons of standards and instruments, and the income derived from this source will, it is thought, aid to a considerable degree in the maintenance of the bureau. The scientific bureaus of the Government will receive the service of the institution free of charge. It is thought that the present Congress will make a liberal appropriation for the purchase of necessary apparatus to equip the laboratories as soon as the buildings are completed."

CHANGE IN ARMY PERSONNEL. THE Regular Army personnel has undergone a very decided change since the Spanish-American war," said an observant Washington man who formerly lived adjacent to a big military post and remembers the type of soldiers who made up the old 25,000 "peace army." "A thing which strikes me as I see the blue uniformed boys marching around town in their comparative youth. There are a lot of mighty young lads enlisted in the army these days, but the majority of them are of a better type than the regulars of other days, apparently youngsters not long out of the high schools. The recent war has made a big difference in the way the army uniform is regarded socially, which perhaps accounts for its adoption by so many of the better class young men of the country. "Another change which occurs to me is the variety of insignia to be observed on

the starboard arms of the soldier boys indicating the branch of the service to which they belong. I don't seem to be familiar with half of them. Then, in the days when I was wont to hover near military parade grounds, the soldiers were compelled by regulations to wear pants with wide 'bell bottoms,' as well as heavy brogans of a uniform pattern on their feet. "Now they wear very properly cut trousers, curved at the bottom with more or less individuality about them, while the selection of footwear is a matter of each man's fancy. I remember when it was a rule that soldiers should wear short-cropped hair, most often clipped by the 'company barber.' Now you see 'em with their caps perched on the top of great bunches of football hair. This cap they are wearing is another new one. Its shape is entirely different from the flat, pancake-shaped sloping affair which was worn in the other days.